

Retrofitting Satellites with Optical Data Relays to Obviate Need for Broadcast Signals from Covert Platforms

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Introduction

As other countries inevitably duplicate capabilities first pioneered decades ago, in this case, ultra-sensitive radio detection equipment is being used by adversaries to locate even the smallest satellites by detecting their radio emissions, there is a need to protect information concerning the real-time position of satellites.

Abstract

Although we are racing to develop a robust entanglement-based data transmission system and there have been important experimental breakthroughs just within the past month, it is projected that those systems are 15 years away from being fielded. In the interim, one possible approach to masking the real-time position of satellites is the use of optical data relays capable of focusing light only in the direction of a single, particular satellite and networking all satellites in this manner so that radio transmissions associated with GPS timing data, secure communications, or visual reconnaissance can be routed through one of thousands of possible proxies wherein only the proxies would emit “broadcast” signals of the sort which reveal location. The transceiver system would include a variable-direction laser capable of selecting from a variety of nearby satellites and choosing to transmit a signal only toward a corresponding transceiver affixed to those satellites by an X-37 satellite retrofit mission.

Ideally, this system would allow important data to still reach its intended recipient without the need for the functional satellites themselves to unmask their own position by emitting any radio signals. It would also allow for any satellite in the overall fleet to be used to relay data in the event satellites come under attack.

It should be pointed out, however, any nation with an X-37-type platform equipped with a long-range LiDAR capability could scout the operative satellites even if they remained radio-silent and tag them with the same sort of combination painting/signal intercept tags in use by the U.S. for years. Reflected light from the side of satellites receiving relayed data would also be a potential giveaway of the position of the operational satellite.

Conclusion

Retrofitting hundreds of satellites with the optical transceivers and conducting the requisite virtual spacewalks would require a non-trivial investment and the fielding of additional X-37 platforms to finish the project in a timely manner. Despite this, it may be worthwhile to explore the possibility

of switching to proxy-operation as the default mode of operation for our most sensitive platforms.